

# INSTALLATION INSTRUCTIONS

## WALL HUNG RSF GAS FIRED CONDENSING BOILER

# GREENSTAR i SYSTEM OPTIONAL INTEGRAL DIVERTER VALVE

FOR CENTRAL HEATING SYSTEMS AND INDIRECT FED DOMESTIC HOT WATER



### Diverter valve kit numbers

12kW	7 716 192 566
15kW	7 716 192 567
18kW	7 716 192 568
24kW	7 716 192 409

### Diverter valve kits contain:

1	Copper return pipe
1	Brass service valve
1	15mm Compression nut
1	15mm Olive
1	Diverter valve motor
1	Diverter valve harness
2	Screws
2	Code plugs
1	Code plug tie

### Code plug numbers

12i System	Natural gas	1118
	L.P.G.	1119
15i System	Natural gas	1122
	L.P.G.	1123
18i System	Natural gas	1126
	L.P.G.	1127
24i System	Natural gas	1114
	L.P.G.	1115

UK/IE



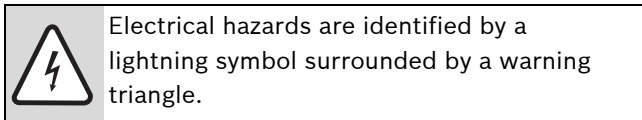
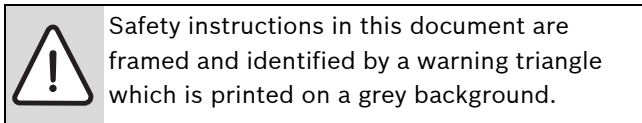
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# 1 KEY TO SYMBOLS AND SAFETY PRECAUTIONS

## 1.1 EXPLANATION OF SYMBOLS

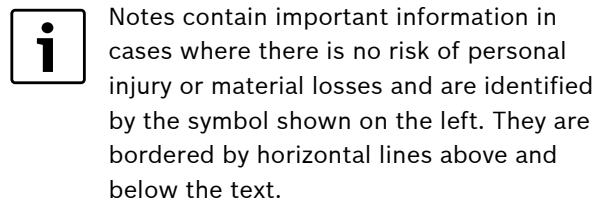
### WARNING SYMBOLS



Signal words indicate the seriousness of the hazard in terms of the consequences of not following the safety instructions.

- **NOTICE** indicates possible damage to property or equipment, but where there is no risk of injury.
- **CAUTION** indicates possible injury.
- **WARNING** indicates possible severe injury.
- **DANGER** indicates possible risk to life.

### IMPORTANT INFORMATION



### ADDITIONAL SYMBOLS

Symbol	Meaning
▶	a step in an action sequence
→	a reference to a related part in the document or to other related documents
•	a list entry
–	a list entry (second level)

Tab. 1 Symbols

### SYMBOLS USED IN THIS MANUAL

	Domestic Hot Water
	Central Heating
	Hot Water Storage Cylinder
	Domestic Cold Water Supply
	Electrical Supply
	Gas Supply

Tab. 2 Commonly used symbols

### PLEASE READ THESE INSTRUCTIONS CAREFULLY BEFORE STARTING INSTALLATION.

THESE INSTRUCTIONS ARE APPLICABLE TO THE WORCESTER APPLIANCE MODEL(S) STATED ON THE FRONT COVER OF THIS MANUAL ONLY AND MUST NOT BE USED WITH ANY OTHER MAKE OR MODEL OF APPLIANCE.

THE INSTRUCTIONS APPLY IN THE UK ONLY AND MUST BE FOLLOWED EXCEPT FOR ANY STATUTORY OBLIGATION.

THIS APPLIANCE MUST BE INSTALLED BY A GAS SAFE REGISTERED, COMPETENT PERSON. FAILURE TO INSTALL CORRECTLY COULD LEAD TO PROSECUTION.

IF YOU ARE IN ANY DOUBT CONTACT THE WORCESTER TECHNICAL HELPLINE.

DISTANCE LEARNING AND TRAINING COURSES ARE AVAILABLE FROM WORCESTER.

PLEASE LEAVE THESE INSTRUCTIONS WITH THE COMPLETED BENCHMARK CHECKLIST, (OR A CERTIFICATE CONFIRMING COMPLIANCE WITH IS 813, EIRE ONLY) AND THE USER MANUAL WITH THE OWNER OR AT THE GAS METER AFTER INSTALLATION OR SERVICING.

THE BENCHMARK CHECKLIST CAN BE FOUND IN THE BACK PAGES OF THE INSTALLATION MANUAL.

ABBREVIATIONS USED IN THIS MANUAL:

Ø	Diameter
NG	Natural Gas
LPG	Liquid Petroleum Gas
CH	Central Heating
DHW	Domestic Hot Water
PRV	Pressure Relief Valve
NTC	Negative Temperature Coefficient (sensor)
IP	Ingress Protection
RCD	Residual Current Device
TRV	Thermostatic Radiator Valve
WRAS	Water Regulations Advisory Scheme
SEDBUK	Seasonal Efficiency of Domestic Boilers in the United Kingdom

Tab. 3 Abbreviations

### 1.2 SAFETY PRECAUTIONS

#### IF YOU SMELL GAS:

- ▶ **CALL** NATIONAL GAS EMERGENCY SERVICE ON 0800 111 999
- ▶ **LPG BOILERS** CALL THE SUPPLIER'S NUMBER ON THE SIDE OF THE LPG TANK
- ▶ **TURN OFF** THE ECV (EMERGENCY CONTROL VALVE) AT THE METER
- ▶ **DO NOT** TURN ELECTRICAL SWITCHES ON OR OFF
- ▶ **DO NOT** STRIKE MATCHES OR SMOKE
- ▶ PUT OUT NAKED FLAMES
- ▶ OPEN DOORS AND WINDOWS
- ▶ KEEP PEOPLE AWAY FROM THE AFFECTED AREA

#### BOILER OPERATION:

**This boiler must only be operated by a responsible adult who has been instructed in, understands, and is aware of the boiler's operating conditions and effects.**



Benchmark places responsibilities on both manufacturers and installers. The purpose is to ensure that customers are provided with the correct equipment for their needs, that it is installed, commissioned and serviced in accordance with the manufacturer's instructions by competent persons and that it meets the requirements of the appropriate Building Regulations. The Benchmark Checklist can be used to demonstrate compliance with Building Regulations and should be provided to the customer for future reference.

Installers are required to carry out installation, commissioning and servicing work in accordance with the Benchmark Code of Practice which is available from the Heating and Hotwater Industry Council who manage and promote the scheme.

Visit **centralheating.co.uk** for more information.

#### HEALTH AND SAFETY

The appliance contains no asbestos and no substances have been used in the construction process that contravene the COSHH Regulations (Control of Substances Hazardous to Health Regulations 1988).

#### COMBUSTION AND CORROSIVE MATERIALS

Do not store or use any combustible materials (paper, thinners, paints etc.) inside or within the vicinity of the appliance.

Chemically aggressive substances can corrode the appliance and invalidate any warranty.

### FITTING AND MODIFICATIONS

Fitting the appliance and any controls to the appliance may only be carried out by a competent engineer in accordance with the current Gas Safety (Installation and Use) Regulations.

Flue systems must not be modified in any way other than as described in the fitting instructions. Any misuse or unauthorised modifications to the appliance, flue or associated components and systems could invalidate the warranty. The manufacturer accepts no liability arising from any such actions, excluding statutory rights.

#### SERVICING

Advise the user to have the system serviced annually by a competent, qualified Gas Safe registered engineer. Approved spares must be used to help maintain the economy, safety and reliability of the appliance.

#### IMPORTANT

The service engineer must complete the Service Record on the Benchmark Checklist after each service.

#### INSTALLATION REGULATIONS

Current Gas Safety (Installation & Use) Regulations:

All gas appliances must be installed by a competent person in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution.

The appliance must be installed in accordance with, and comply to, the current: Gas Safety Regulations, IEE Regulations, Building Regulations, Building Standards (Scotland) (Consolidation), Building Regulations (Northern Ireland), local water by-laws, Health & Safety Document 635 (The Electricity at Work Regulations 1989) and any other local requirements.

**British Standards:**

Where no specific instruction is given, reference should be made to the relevant British Standard codes of Practice.

- BS7074:1 Code of practice for domestic and hot water supply
- BS6891 Installation of low pressure gas pipe work up to 28mm (R1)
- BS5546 Installation of gas hot water supplies for domestic purposes
- EN12828 Central heating for domestic premises
- BS5440:1 Flues and ventilation for gas appliances of rated heating not exceeding 70kW (net) : Flues
- BS5440:2 Flues and ventilation for gas appliances of rated heating not exceeding 70kW (net) : Air Supply
- BS7593 Treatment of water in domestic hot water central heating systems
- BS6798 Installation of gas fired boilers of rated input up to 70kW (net)

**Irish Standards**

The relevant Irish standards should be followed, including:

- ECTI National rules for electrical installations
- IS 813:2002 for Domestic Gas Installations.

**LPG Installations**

An appliance using L.P.G. must not be installed in a room or internal space below ground level unless one side of the building is open to the ground.

**Timber framed building:**

Where the boiler is to be fitted to a timber framed building the guidelines laid down in BS5440: Part 1 and IGE "Gas Installations in Timber Frame Buildings" should be adhered to.

**Potable water:**

All seals, joints and compounds (including flux and solder) and components used as part of the secondary domestic water system must be approved by WRAS.


**CH Water:**

Artificially softened water must not be used to fill the central heating system.

## 2 PLUMBING MANIFOLD

CONNECTIONS:


- Heating System: 22mm compression fittings
- Gas: 22mm compression fitting
- Cylinder Return 15mm compression fitting
- Use the fittings supplied in the Hardware literature pack and the Optional Diverter Valve Kit.



**NOTICE:** Fitting the service valve

- ▶ Refer to figure 2
- ▶ The service valve (7) from the Optional Diverter Valve Kit must be fitted and secured to the wall mounting frame with two screws (8) supplied, before the wall mounting frame is fitted to the wall.

If the boiler pipes are to be run behind the appliance ensure that the pipes pass through the slot in the guide (9). This is fitted to the boiler frame.



Further guidance on pipe routing can be found printed on the boiler template (supplied with the boiler).

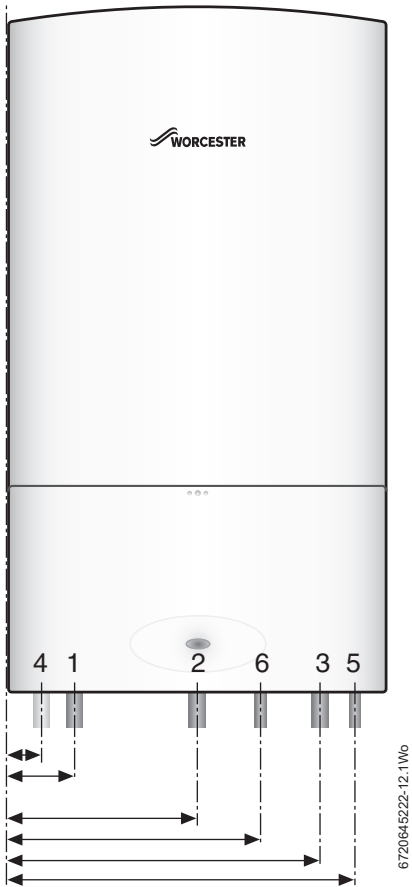


Fig. 1 Pipe dimensions

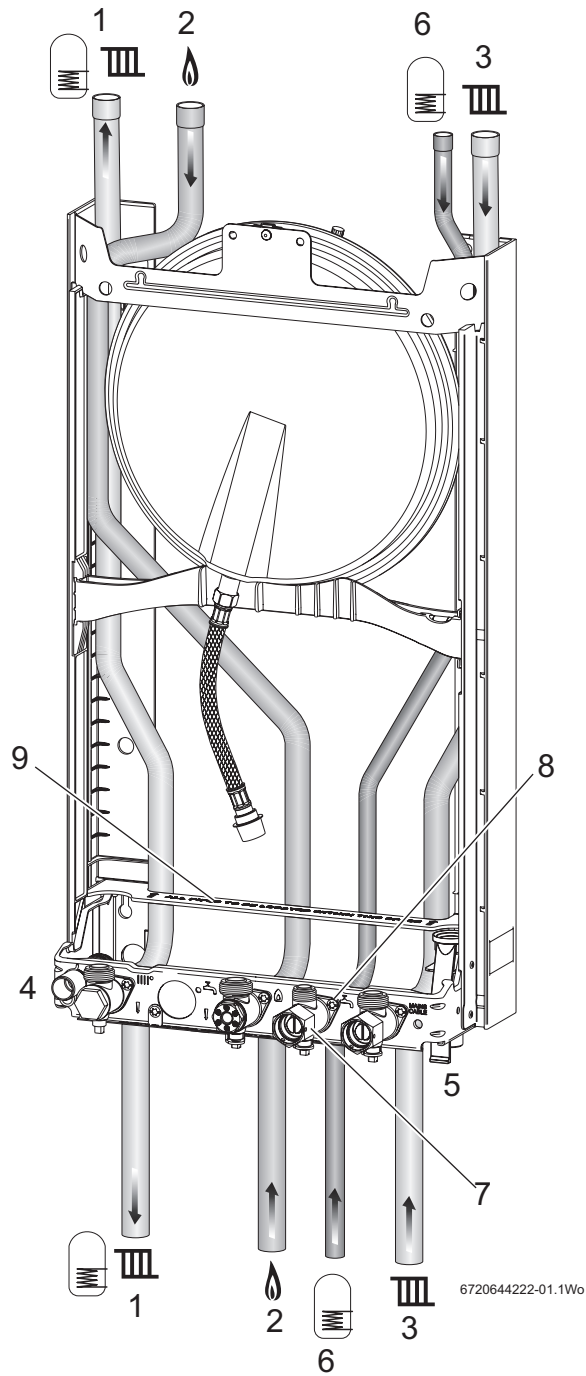


Fig. 2 Plumbing manifold with wall frame

#	Function	From left case edge	Diameter of pipe
1	CH and cylinder flow	70 mm	22 mm
2	Gas	200 mm	22 mm
3	CH Return	330 mm	22 mm
4	Condensate	35 mm	22 mm
5	Pressure Relief Valve	367 mm	15 mm
6	Cylinder return	267 mm	15mm

Tab. 4 Key to figures 1 & 2

### 3 BOILER CONNECTIONS


**CAUTION: CYLINDER RETURN PIPE**

- The following must be completed before the boiler is mounted onto the wall mounting frame

#### 3.1 ASSEMBLY OF THE INTERNAL CYLINDER RETURN PIPE TO THE BOILER

Use the packaging as protection, turn the boiler on its left hand side to enable fitting of the hot water return pipe.

- Move the control panel into the service position by removing the screw from the retaining bracket.
1. Loosen the two retaining screws to free the back clamping plate on the hydraulic block as shown in figure 3.
  2. Remove the brass bung assembly from the hydraulic block by removing the screw and sliding it free from the flange on the clamping plate. Make sure that the other brass bung assembly is retained in place.
  3. Remove the copper pipe from the Optional Integral Diverter Valve Kit and feed the flat end of the pipe through the rear of the boiler as shown.
  4. Before fitting the pipe, check that the seal is in position on the plastic moulding. Slide the flat end of the pipe under the flange on the hydraulic block clamping plate ensuring that pipe is located correctly.
  5. Secure the clamping plate by re-tightening the two screws (1) loosened in step 1.

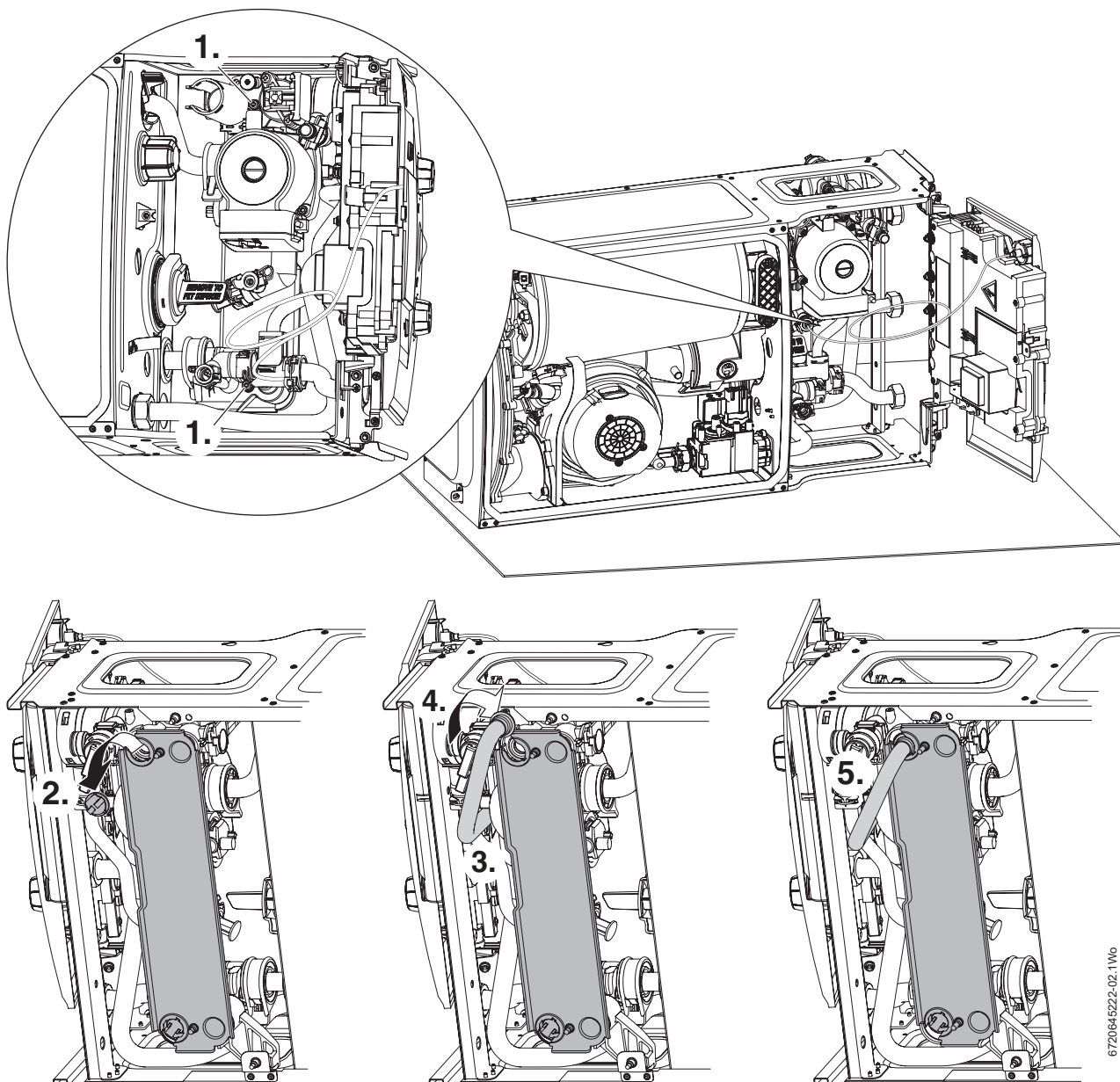



Fig. 3 Hot water return pipe fitting

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## 3.2 GAS AND WATER CONNECTIONS




**CAUTION:**

- ▶ ISOLATE THE MAINS GAS SUPPLY BEFORE STARTING ANY WORK AND OBSERVE ALL RELEVANT SAFETY PRECAUTIONS.

- ▶ Remove template and secure the wall mounting frame to the wall with the fittings supplied.
- ▶ System pipes may be run vertically upwards behind the boiler or below it.  
See Plumbing Manifold Section on page 6.

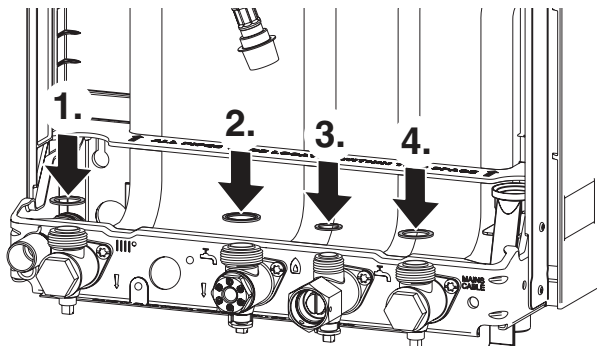
1. CH and cylinder flow (22mm),
2. Gas inlet (22mm),
3. Cylinder return(15mm),
4. CH return (22mm)

If using the optional filling loop: 7 716 192 281 (not supplied with the boiler) fit it before hanging the boiler on the wall frame.




The bonded washer supplied is for the Gas connection only.

- ▶ Fit sealing washers to service valves before hanging boiler.



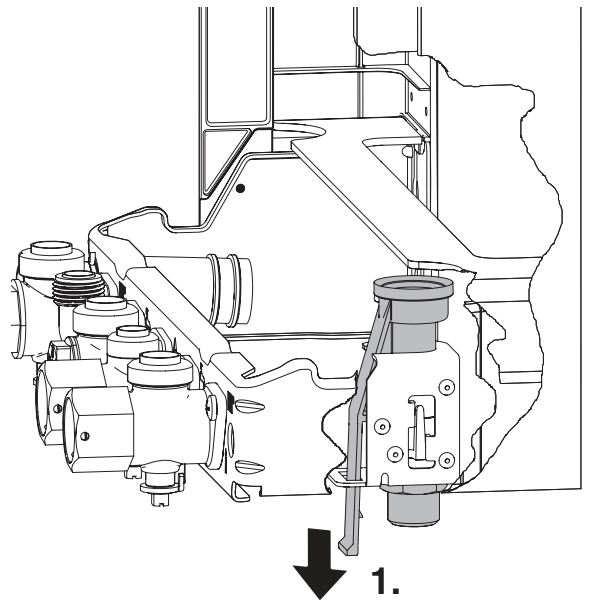
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Fig. 4 Sealing washers




**NOTICE:** Before hanging the boiler onto the wall mounting frame ensure that the pressure relief valve connection is in the DOWN position. This is located on the right hand side of the wall frame at the rear.

1. Pull the extended tab/lever forward and down until there is no further travel.



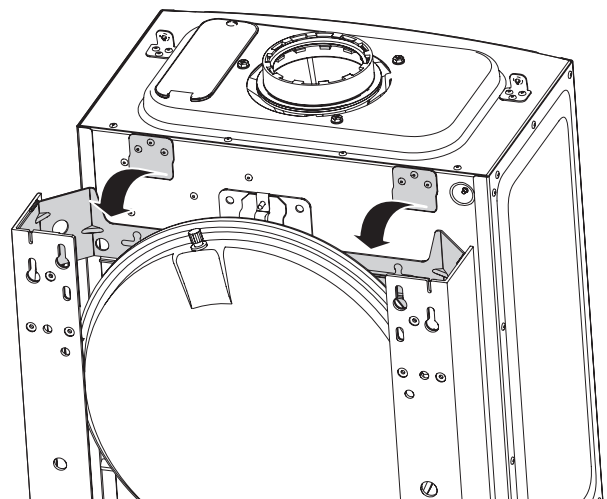
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Fig. 5 PRV connection in the down position




**CAUTION:** Caps or plastic strip fitted to pipes must be removed before hanging the boiler.

- ▶ Hang the boiler on to the wall mounting frame by the two brackets positioned left and right at the top rear of the appliance.  
Do not lift the appliance by the air gas manifold. There are two handling holes incorporated into the inner casing left and right in the lower section of the appliance.



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Fig. 6 Hanging the boiler



**NOTICE:** The pressure relief connector must be repositioned after the boiler has been correctly mounted to the wall mounting frame.



1. Push the lever on the pressure relief connector UP until the stop on the inside of the handle is over the shoulder of the metal bracket to secure in place.

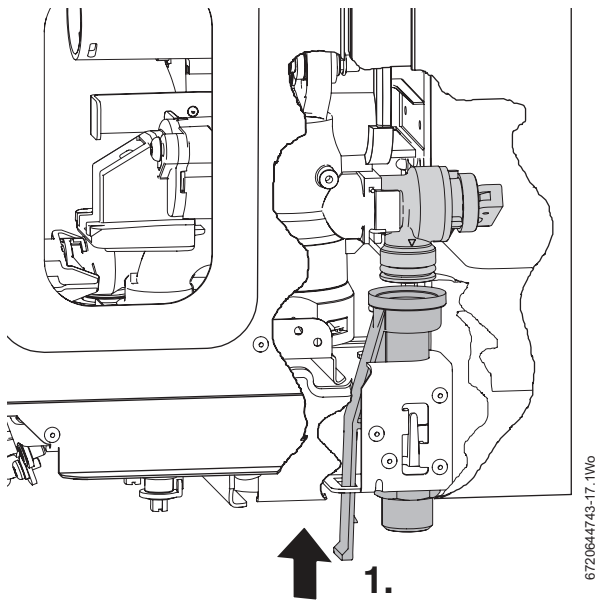


Fig. 7 PRV in the up position

- Remove the screw from the control panel retaining bracket and lower the control panel into the service position.
- Make connections to the heating system and cylinder. Connect the gas supply to the boiler gas cock 22mm compression.

To connect the expansion vessel flexible pipe to the hydraulic manifold situated to the left of the pump:

- Remove and discard the plastic cap from the expansion vessel flexible pipe.
1. Refer to figure 8, release the retaining clip.
  2. Remove and discard the orange plastic blanking plug (2) from the pressure vessel connection at the hydraulic manifold.

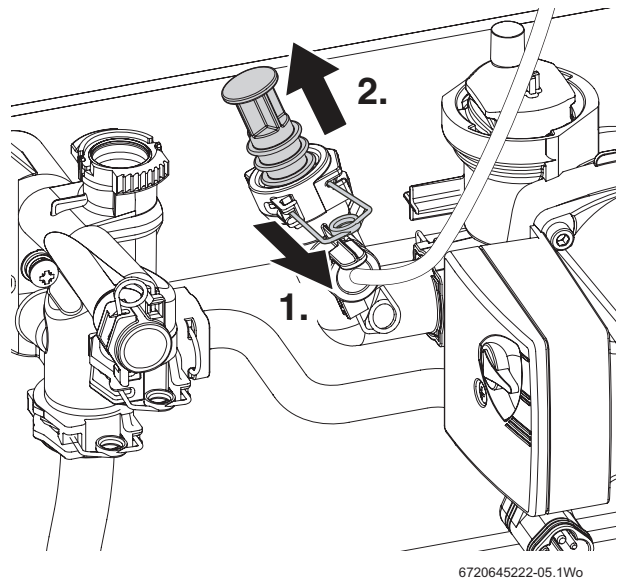


Fig. 8 Blanking plug removal

1. Refer to figure 9 and insert the expansion vessel flexible pipe it to the fitting on the pump.
2. Secure in place with the wire retaining clip.

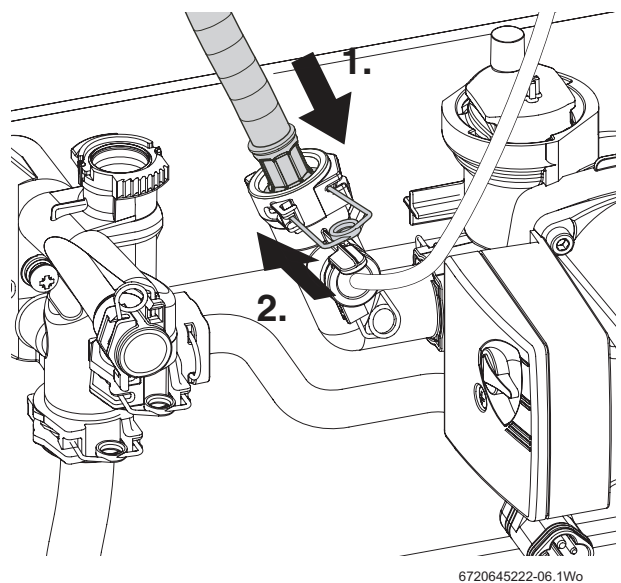


Fig. 9 Expansion vessel connection

- Connect the pressure relief drain pipe to 15mm compression joint using the compression nut and olive supplied in the literature/hardware pack.

## 4 FITTING THE DIVERTER VALVE AND CODE PLUG

### 4.1 FITTING THE DIVERTER VALVE MOTOR:

1. Remove the diverter blanking plate by pulling it forwards to free it from its location.

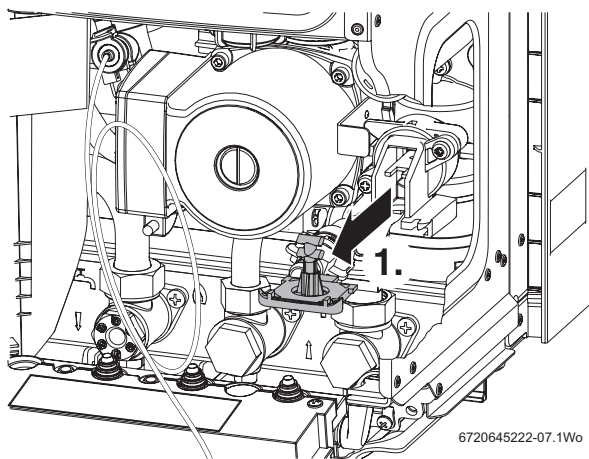


Fig. 10 Removing Diverter valve blanking plate

1. To fit the diverter valve motor, push the motor into the housing until the motor “clicks” securely into place, ensuring that the actuator arm locates into the middle of the “H” receptor on the motor.
2. Connect the plug of the diverter valve motor harness into the socket on the diverter valve motor.
3. Slide the protective cover over the diverter valve motor.

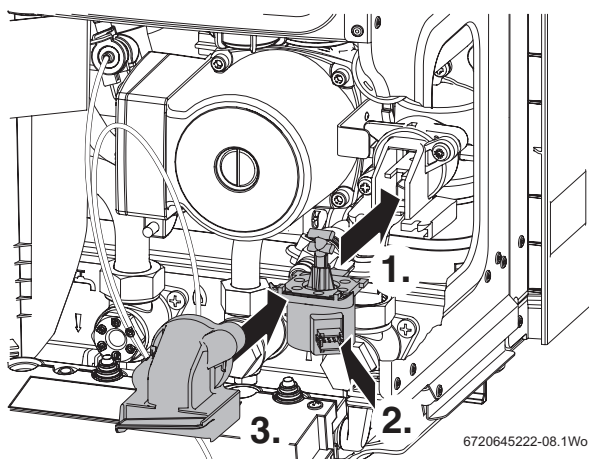


Fig. 11 Fitting Diverter motor and cover

### 4.2 ACCESS TO THE CODE PLUG

1. Referring to figure 12, unscrew the three screws in the control panel.
2. Pull off the connections cover.

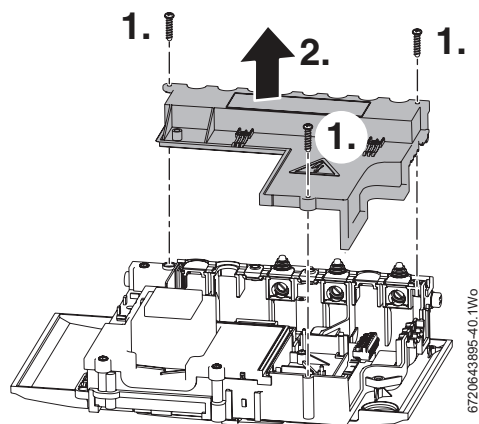


Fig. 12 Removing the connection cover

- Identify ST18, the code plug and connector.

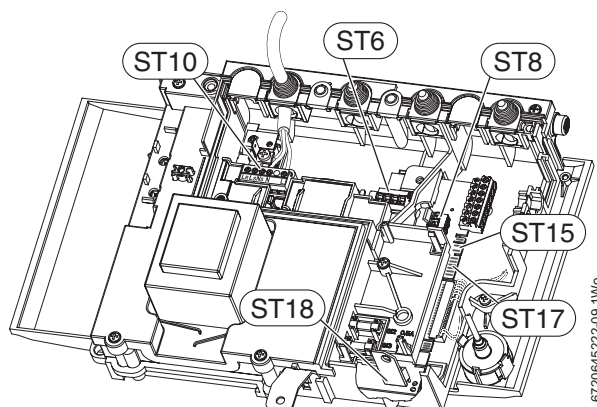


Fig. 13 Connector locations



#### NOTICE: RESET THE CONTROL BOARD

Following changes to the wiring of ST15 and ST8 the control board will need to be reset to recognise the new connection.

To reset the control board:

- Hold the Service mode “Spanner” and the Eco buttons down for at least five seconds.

### 4.3 FITTING THE CODE PLUG

Boiler size	Gas	Code plug no.
12kW i System kit	NG	1118
	LPG	1119
15kW i System kit	NG	1122
	LPG	1123
18kW i System kit	NG	1126
	LPG	1127
24kW i System kit	NG	1114
	LPG	1115

1. Refer to figure 14. Remove the code plug from the controller, cut the tie securing the plug to the boiler chassis and discard the plug and tie.
  2. Fit the code plug from the kit making sure that code plug is secured to the boiler chassis with the new tie.
- Confirm that the number on the code plug corresponds to the boiler type in the table above.

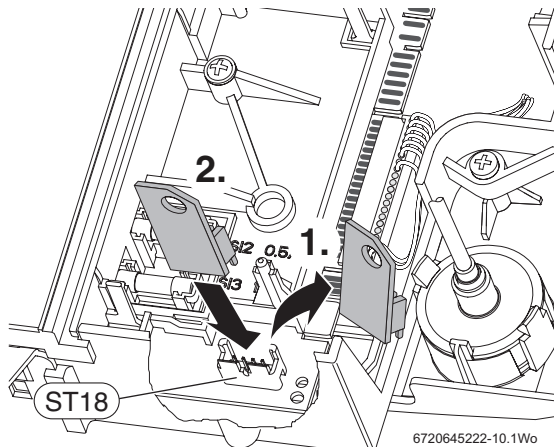


Fig. 14 Fitting new code plug

### 4.4 FITTING THE CYLINDER TEMPERATURE SENSOR

Refer to the cylinder installation instructions for the position of the sensor, there may already be a “sensor pocket” available. If no “pocket” is available, for foam insulated cylinders only with no metal jacket, follow the steps below.

1. Mark a rectangular hole of approximately 50 by 100mm approximately one third of the cylinder length from the bottom of the cylinder.

**CAUTION:** Cut carefully!

- Do not pierce the wall of cylinder.
- Do not cut any metal insulation jacket.

1. Using a sharp knife, cut through the insulation, remove and retain the piece of insulation.
2. Apply heat conductive paste to the sensor and place the sensor on the cylinder body in the middle of the cut-out.
3. Hold the sensor in position with a piece of aluminium tape.
4. Replace the insulation material.
5. Secure the insulation in place with suitable cloth tape.

**NOTICE:** Figure 15 applies only to foam covered open vent cylinders.

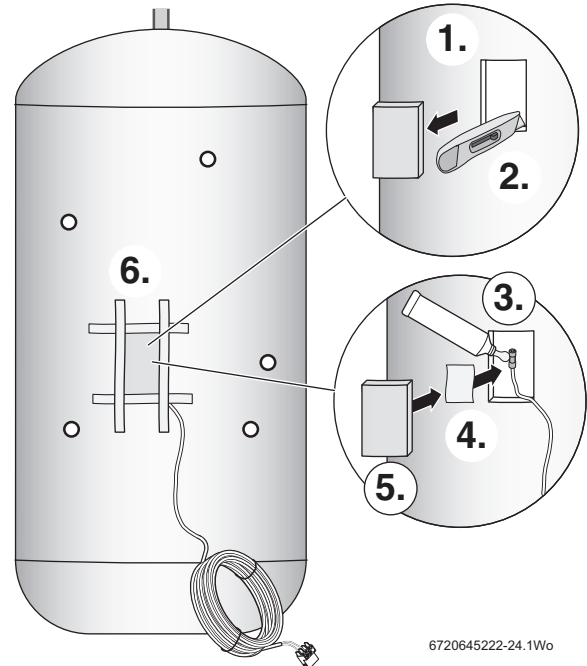


Fig. 15 Sensor connection to cylinder

### 4.5 DIVERTER VALVE AND SENSOR CONNECTIONS

**NOTICE:** Do not route low voltage cables alongside mains voltage cables. This can cause interference on the low voltage cables.

1. Connect the Diverter valve motor harness to the edge connector ST17.
2. Connect the cylinder temperature sensor (1) to the edge connector ST15.

**i** If the ST15 connector and sensor is being used do not connect ST8 as well. The link is not required.

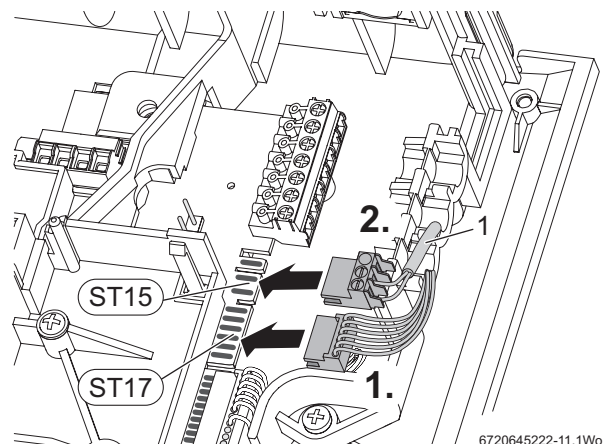


Fig. 16 Diverter motor and sensor connections

- Replace the control panel cover.
- Move the control panel to the up position and secure.

## 5 ELECTRICAL


**NOTICE:**

- ▶ Mains supply to the boiler must be through a fused double pole isolator situated adjacent to the appliance. The isolator must have a contact separation of 3mm minimum in both poles. External fuse rating 3A.
  - ▶ When stripping wires always ensure copper strands do not fall into the control box.
  - ▶ There should be no external wiring centre.
  - ▶ A fascia mounted twin channel programmer must be used.
- Timers available:
- DT20 Twin Channel Programmer (7 716 192 038),  
 DT10RF Digistat (7 716 192 052),  
 DT20RF Digistat (7 716 192 054).

### 5.1 INTERNAL DIVERTER VALVE WITH A VENTED CYLINDER

**ACCESS TO ELECTRICAL CONNECTIONS:**

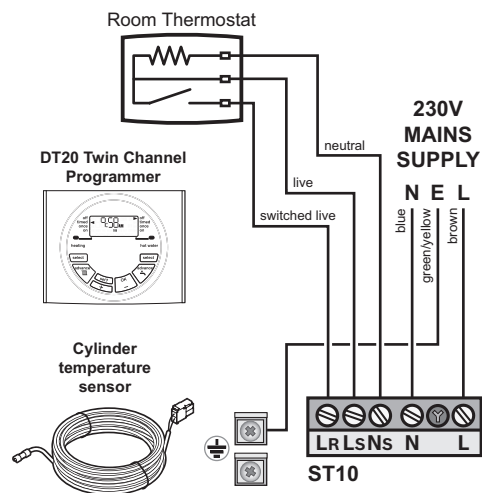
Remove boiler casing to access control panel.

1. Unscrew the single screw and lower the control box into the horizontal position.
2. Unscrew the three screws in the control panel and pull off the connections cover.
3. 230V room thermostat with timer 7 716 192 038 (ST10):

- ▶ Remove link -  $L_S/L_R$
- ▶ Connect room stat LIVE supply to terminal ( $L_S$ )
- ▶ Connect room stat LIVE return to terminal ( $L_R$ )
- ▶ Connect room stat NEUTRAL to terminal ( $N_S$ )


**NOTICE:**

- ▶ If the timer 7 716 192 052 or 7 716 192 054 is used, the room thermostat is incorporated in the transmitter. Therefore keep link fitted across  $L_S/L_R$ .

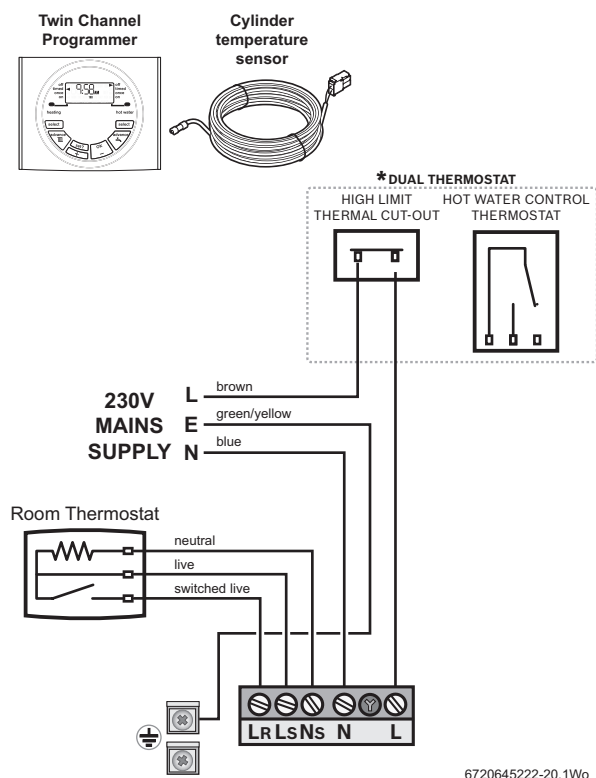


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Fig. 17

4. Hot water channel
  5. Optional external frost stat connection (ST6):
- ▶ Connect frost stat wires to terminal ( $F_S$ ) and ( $F_R$ )
6. Diverter valve motor (ST17):
- ▶ Connect electrical harness from diverter valve motor to ST17 (see following page).

## 5.2 INTERNAL DIVERTER VALVE WITH AN UNVENTED CYLINDER



### OPTIONAL EXTERNAL FROST STAT CONNECTION ST6

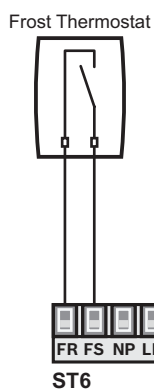


Fig. 18 Frost Thermostat

- Connect frost thermostat cables to terminals  $F_S$  &  $F_R$ .
- These are not polarity sensitive.

### CONNECTOR LOCATIONS

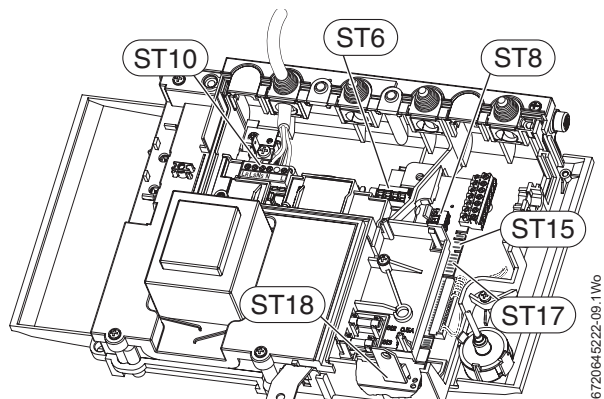


Fig. 19 Electrical connector information

## 5.3 POSITION OF WIRED COMPONENTS

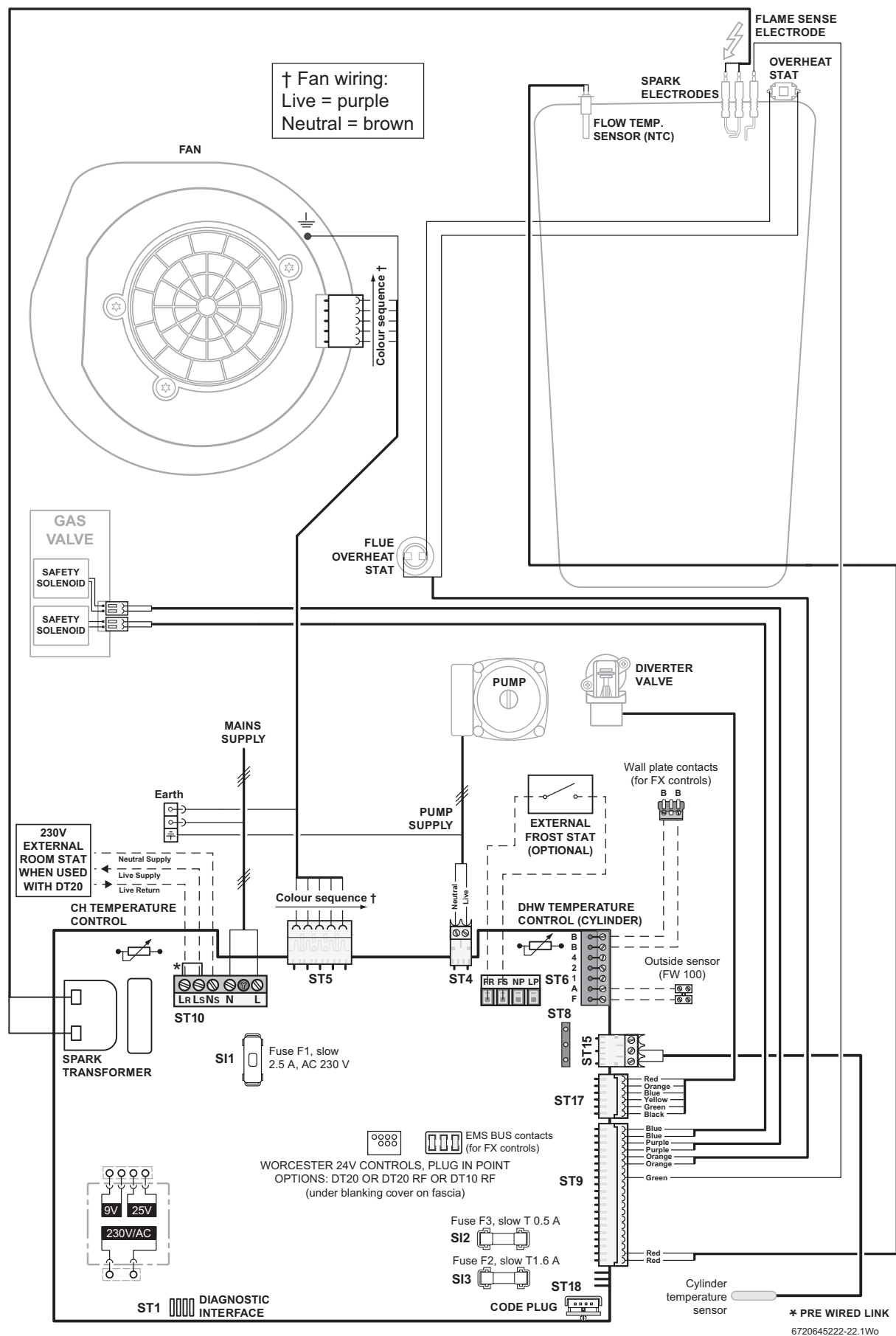


Fig. 20 Wired components

## 6 PRE-COMMISSIONING CHECKS



**NOTICE:** If the boiler is not to be commissioned immediately then:

- ▶ after successfully completing all of the checks and any rectification work, close the gas and water valves, shut off the gas supply, electrically isolate the boiler and label appropriately.

1. Check that the service and water pipes are connected to the correct position on the manifold.
  - A - Flow (22mm)
  - B - CH Return (22mm)
  - C - Gas inlet (22mm)
  - D - Cylinder Return (15mm)
2. Check the gas type specified on the identification plate matches that of the gas supply. Turn on the main gas supply, check the gas pipework, connections and rectify any leaks.
3. Check that the condensate pipe has been connected to the syphon.
4. Check pressure relief drain pipe is correctly fitted and securely tightened.



**NOTICE:**

- ▶ NOW RETURN TO THE I SYSTEM INSTRUCTION MANUAL (FILLING THE SYSTEM) TO CONTINUE INSTALLATION.



## **7 BOILER FUNCTION**

### **7.1 FAULT FINDING**

If in the unlikely event the boiler does not give complete satisfaction, before calling for a service engineer, the installer should check the following:-

#### **FOR BOILERS WITH INTEGRAL DIVERTER VALVE AND CONTROLS**

##### ***NO CENTRAL HEATING, BUT HOT WATER OK***

Remove the room stat wiring from Ls, LR and N from terminal block ST10. Fit a link between Ls and LR, if the CH now works there is likely to be a problem with the room stat or wiring to it.

##### ***NO HOT WATER, BUT CENTRAL HEATING OK***

If a cylinder stat is used, remove the cylinder stat wiring from 7 and 9 on the terminal block ST8. Fit link across 7 and 9.

If the HW now functions, there is likely to be a problem with the cylinder stat or wiring to the stat.

#### **FOR ALL BOILERS WITH INTERNAL OR EXTERNAL CONTROLS**

##### ***Burner lights then goes out in DHW or CH mode***

Does the boiler run normally with the front cover off and then fail when the cover is put back on?

If yes there is likely to be a flue problem - either the air inlet is blocked or the inner flue is leaking flue gases into the air inlet.

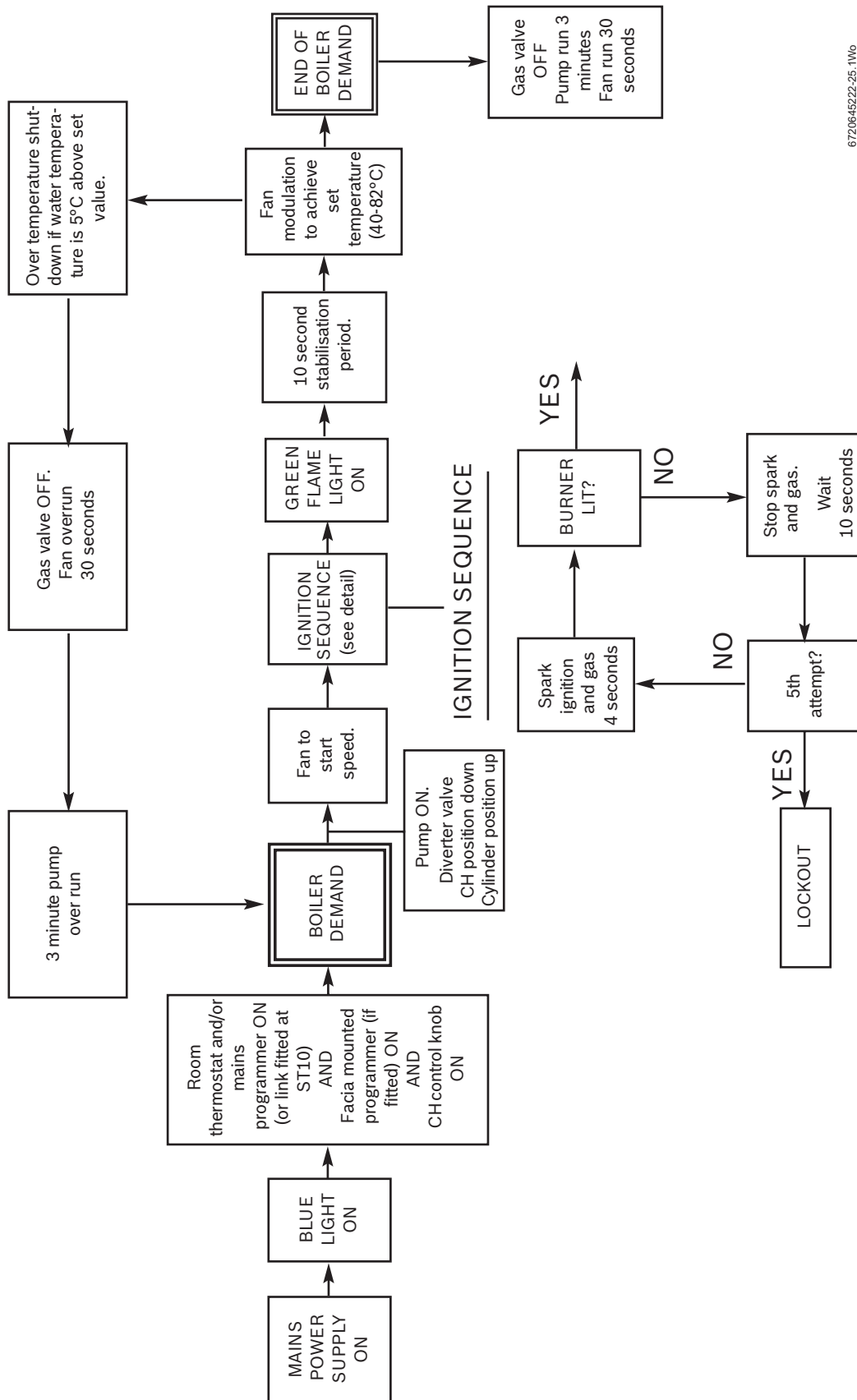
##### ***BOILER NOISY OR GOING TO OVERHEAT***

1. Was the system flushed?
2. Has the pump been bled and the dust cap released.

#### **GENERAL CHECKS**

1. Is all the air bled from the gas supply?
2. Is all the air bled from the primary water system?
3. Is there 230v ac across the boiler live and neutral terminals?  
(L & N on ST10)
4. Is the polarity correct?
5. Is the incoming gas pressure at least 18mbar with the boiler at maximum output?

## 7.2 BOILER FUNCTION

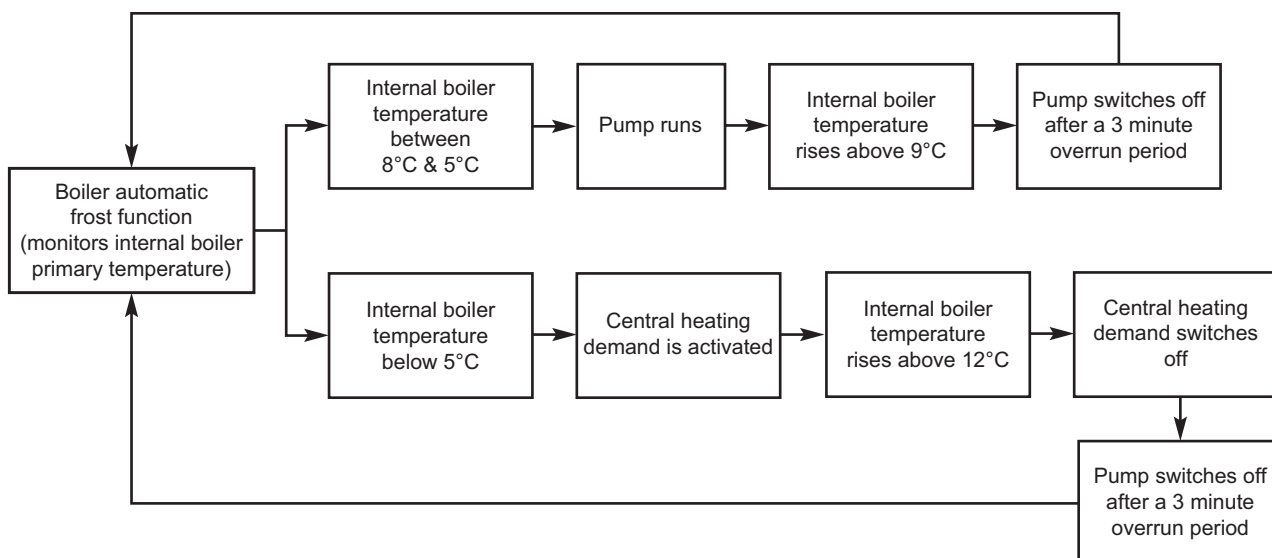


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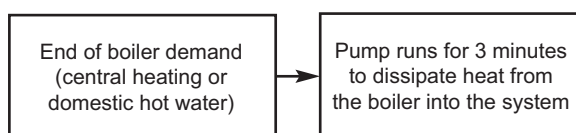
Fig. 21 Boiler function

## 7.3 PROTECTION FUNCTION

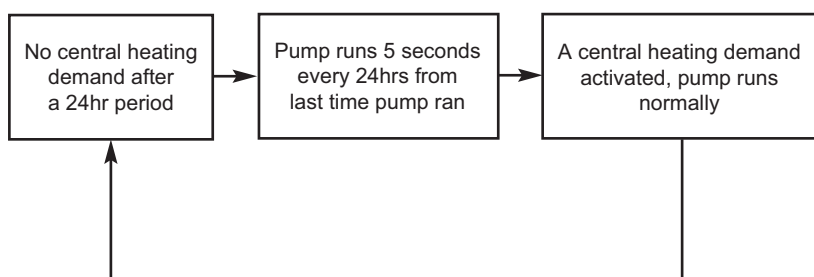
### AUTOMATIC INTERNAL FROST FUNCTION



### PUMP OVERRUN FUNCTION



### PUMP ANTISEIZE FUNCTION



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Fig. 22 Protection function

## NOTES

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